BIOLOGICAL EVALUATION
Spruce Budworm Infestation

National Forest and Adjacent Indian,
State, and Private Lands

New Mexico

1963

D. D. Lucht

This report summarizes the fifth consecutive year of egg mass surveys in the Southwestern Region. This year's survey began August 13 and was concluded on August 28, with 17 plots being sampled. Thirteen plots were located in 450,000 acres of infested host type, and four were located in the 1962-treated area on the eastern division of the Carson National Forest, Taos, New Mexico.

The sampled area was divided into five entomological units. The Eagle Nest Unit represents State and private land east of the Carson National Forest; Chama Unit represents private land in the Tierra Amarilla Grant; Glenwood Unit represents the Gila National Forest; Cloudcroft Unit represents the Lincoln National Forest and the Mescalero Indian Reservation; and the Taos Unit represents the 1962-treated area on the eastern division, Carson National Forest. (See map.)

Based on the current egg mass data from individual units, the 1964 budworm population is expected to cause light to heavy defoliation. Severe defoliation, however, is expected in localized areas within some of these units. In areas defoliated annually for the past several years, tree vigor will continue to decline, resulting in top killing and tree mortality.

General Information

Insect - Spruce budworm Choristoneura fumiferana (Clem.)

Hosts - Douglas-fir Pseudotsuga menziesii (Mirb.) Franco
White fir Abies concolor (Gord. & Glend.) Lindl.
Corkbark fir Abies lasiocarpa var. Arizonica (Merriam) Lemm.
Blue spruce Picea pungens Engelm.
Engelmann spruce Picea engelmanni Parry

Type of Damage - Variation is exhibited by the infestation in the untreated units. The Eagle Nest Unit is in the heavy defoliation category,[1/] while the Chama Unit is

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1/ Defoliation categories are: Light - defoliation barely visible; moderate - top one-fourth of tree defoliated; heavy - one-half of tree defoliated; very heavy - three-fourths of tree defoliated.

in the moderate defoliation category. The Glenwood Unit falls in the light category, while the Cloudcroft Unit falls in the moderate category. The Taos Unit (1962-treated) is at the lower limits of the light category.

Extent and Location of Infestation - The present infestation extends throughout 450,000 acres of host type on National Forest, Indian, State, and private lands in New Mexico. (See map.)

Acreages infested by the spruce budworm in Region 3 since 1956, as detected by aerial and ground surveys, are as follows:

1956	35,520	1960	697,760
1957	62,620	1961	1,029,780 1/
1958	205,120	1962	920,000 2/
1959	619,920	1963	450,000

1/ 444,910 treated in 1962
2/ 569,000 treated in 1963

Biological Information

Sampling Method - Nine new plots and eight old plots were sampled. The new plots were established on the following lands: two on Philmont Scout Ranch, one on LeBus Brothers Ranch, and one on the New Mexico Game and Fish Wildlife area. Two were established on the Gila National Forest, two on the Lincoln National Forest, and one on the Mescalero Indian Reservation. Four old plots were sampled on the Tierra Amarilla Grant. Four old plots were sampled in the 1962-treated area, Carson National Forest.

Each sample plot consisted of five dominant or codominant Douglas-fir trees. Two men using a 30-foot pole with pruning saw removed two lower midcrown branches. Foliage from one side of each branch was clipped and discarded. The remaining foliage was then placed in a triangle, measured and placed in numbered cotton bags. The equivalent of one entire branch per tree, or five branches per plot, was thus sampled.

All foliage samples were examined by three female biological aides at [Taos] Santa Fe New Mexico. Needles with egg masses, or similar material, were removed and placed in numbered pill boxes. The author then examined the needles and separated budworm egg masses from the exotic material. The masses were then grouped as either old or new and examined for evidence of parasitism.

Egg Parasitism - No parasitized new egg masses were found in any of the units in 1963.

Egg Mass Densities:

Eagle Nest Unit. A total of 24,274 square inches of Douglas-fir foliage was examined from four plots. New egg masses average 10.5 per thousand square inches of foliage, indicating heavy defoliation for 1964. (Table I.) The trees in this area have sustained varying degrees of defoliation for several years. This accumulated damage, in addition to the expected heavy defoliation in 1964, will cause top killing and probably some tree mortality in 1964. In the Cyphers Mine drainage of the Philmont Ranch, extreme defoliation will occur, as indicated by the new egg mass count of 24.2 per thousand square inches of foliage examined.

Due to the lack of parasites and other natural control factors, no natural decline in the budworm population is expected. The land manager concerned should consider direct suppression measures if further damage is to be prevented.

TABLE I

Summary of Spruce Budworm Egg Mass Counts from Four Douglas-fir Plots in the Eagle Nest Unit, New Mexico, 1963

Unit - Plot Location	Sq. Inches of Foliage Examined	New Egg Masses Per 1,000 Sq. In. Foliage 1963
Eagle Nest, Northern N.Mex.		
Private 1/		
Cyphers Mine, Philmont	4,252	24.2
Garcia Peak, Philmont	10,008	2.5
LeBus Bros.	4,354	5.3
State 1/		
Wildlife Area, State	5,660	9.9
Total	24,274	41.9
Average	6,068	10.5

1/ New plots established August 1963.

Chama Unit. A total of 32,686 square inches of Douglas-fir foliage were examined from four plots. New egg masses average 8.1 per thousand square inches of foliage, indicating moderate defoliation for 1964. (Table II.) Since 1959, the trees in this area have sustained moderate to extreme defoliation, as shown by the annual egg mass counts. (Table III.) This accumulated damage, in addition to the expected moderate defoliation in 1964, will continue to cause top killing and tree mortality in 1964. In the Brazos area, severe defoliation will occur next year, as indicated by the new egg mass count of 17.9 per thousand square inches of foliage examined.

Parasites and other natural control factors are lacking; therefore, no natural decline in the budworm population is expected. The land owner concerned should consider direct suppression measures, especially in areas of high aesthetic value, if further damage is to be prevented.

TABLE II

Summary of Spruce Budworm Egg Mass Counts from Four Douglas-fir Plots, Chama Unit, New Mexico, 1963

Unit - Plot Location	Sq. Inches of Foliage Examined	New Egg Masses Per 1,000 Sq. In. Foliage 1963
Chama, Northern New Mexico		
Private		
Tierra Amarilla Grant		
Lobo Lodge	6,340	3.9
Willow Creek	8,894	9.4
Canones Creek	9,616	1.5
Brazos Box	7,836	17.9
Total	32,686	32.7
Average	8,171	8.1

TABLE III

Summary of New Egg Masses for Four Plots in Chama Unit From 1959 Through 1963

Unit - Plot Location	Average Number of Unparasitized New Egg Masses per 1,000 Square Inches of Foliage				
	1959	1960	1961	1962	1963
Northern New Mexico					
Private					
Tierra Amarilla Grant					
Lobo Lodge	23.1	92.1	46.8	32.7	3.9
Willow Creek	21.4	46.2	42.0	28.5	9.4
Canones Creek	13.6	32.4	26.5	9.3	1.5
Brazos Box	--	32.5	25.0	20.9	17.9
Average	14.5	50.8	35.0	22.8	8.1

Glenwood Unit. A total of 19,128 square inches of Douglas-fir foliage were examined from two plots. New egg masses averaged 0.3 per thousand square inches of foliage indicating very light defoliation for 1964. (Table IV.) This infestation was reported in 1963. At present, timber values in the sampled area are not threatened. Therefore, direct suppression is not recommended.

TABLE IV

Summary of Spruce Budworm Egg Mass Counts from Two Douglas-fir Plots, Glenwood Unit, New Mexico, 1963

Unit - Plot Location	Sq. Inches of Foliage Examined	New Egg Masses Per 1,000 Sq. In. Foliage 1963
Glenwood, Southern New Mexico		
Gila N.F.1/		
Bearwallow	9,600	0.2
Willow Creek Ranch	9,528	0.4
Total	19,128	0.6
Average	9,564	0.3

1/ New plots established August 1963.

Cloudcroft Unit. A total of 42,668 square inches of Douglas-fir foliage were examined from three plots. New egg masses average 6.3 per thousand square inches of foliage, indicating moderate defoliation for 1964. (Table V.) This infestation was detected from the 1963 aerial survey and had not been previously reported. The possibility exists that the infestation may be rapidly building up to epidemic levels due to environmental factors, stand conditions, and the absence of natural control factors. Timber values are not immediately threatened in 1964. If the population buildup continues unchecked, direct suppression may be necessary in 1965, especially in the vicinity of Sacramento Lookout, where severe defoliation to reproduction is expected in 1964.

TABLE V

Summary of Spruce Budworm Egg Mass Counts from Three Douglas-fir Plots, Cloudcroft Unit, New Mexico, 1963

Unit - Plot Location	Sq. Inches of Foliage Examined	New Egg Masses Per 1,000 Sq. In. Foliage 1963	
Cloudcroft, Southern New Mexico			
Lincoln N.F.1/			
Sacramento L.O.	18,060	13.8	52.2
Nelson Canyon	10,762	5.1	10.6
Indian Land1/			
Mescalero Ind. Res.	13,846	0.0	
Total	42,668	18.9	
Average	14,222	6.3	

1/ New plots established August 1963.

Taos Unit. (Treated 1962) A total of 37,368 square inches of Douglas-fir foliage were examined from four plots. New egg masses averaged 0.8 per thousand square inches of foliage. (Table VI.) This low count per unit of foliage examined indicates that the 1962 suppression efforts were successful; also, that moth flights from infested areas adjacent to the treated area apparently have not as yet contributed to a population buildup in the treated area.

TABLE VI

Summary of Spruce Budworm Egg Mass Counts from Four Douglas-fir Plots, Taos Unit, 1962-Treated Area, Carson National Forest, New Mexico, 1963

Unit - Plot Location	Sq. Inches of Foliage Examined	New Egg Masses Per 1,000 Sq. In. Foliage 1963	
Taos, Northern New Mexico			
Carson N.F.			
LaJunta	7,026	0.5	0.1
Flechado Pass	11,526	0.0	0.0
Picuris Peak	8,332	2.7	3.7
Taos Canyon	10,484	0.0	0.7
Total	37,368	3.2	
Average	9,342	0.8	

Discussion and Conclusions

Variation is expected in the spruce budworm population and resulting damage throughout the four units of infestation. In the two units of State and private ownership (namely Eagle Nest and Chama), moderate to heavy damage is predicted for 1964. Although the evaluation shows a rather dramatic decrease in total new egg masses collected in 1963, two factors must be considered for these two areas. First, it is known that these units have been subjected to budworm defoliation from five to eight years. This period of feeding has lowered tree vigor and is already causing top killing and tree mortality. With moderate to heavy defoliation predicted for 1964, an intensification of these conditions is to be expected. Secondly, there has been a sharp decrease in parasitism of egg masses, dropping from 13 percent in 1961 to none in 1963. Without this natural influence, larger populations will survive to feed in 1964.

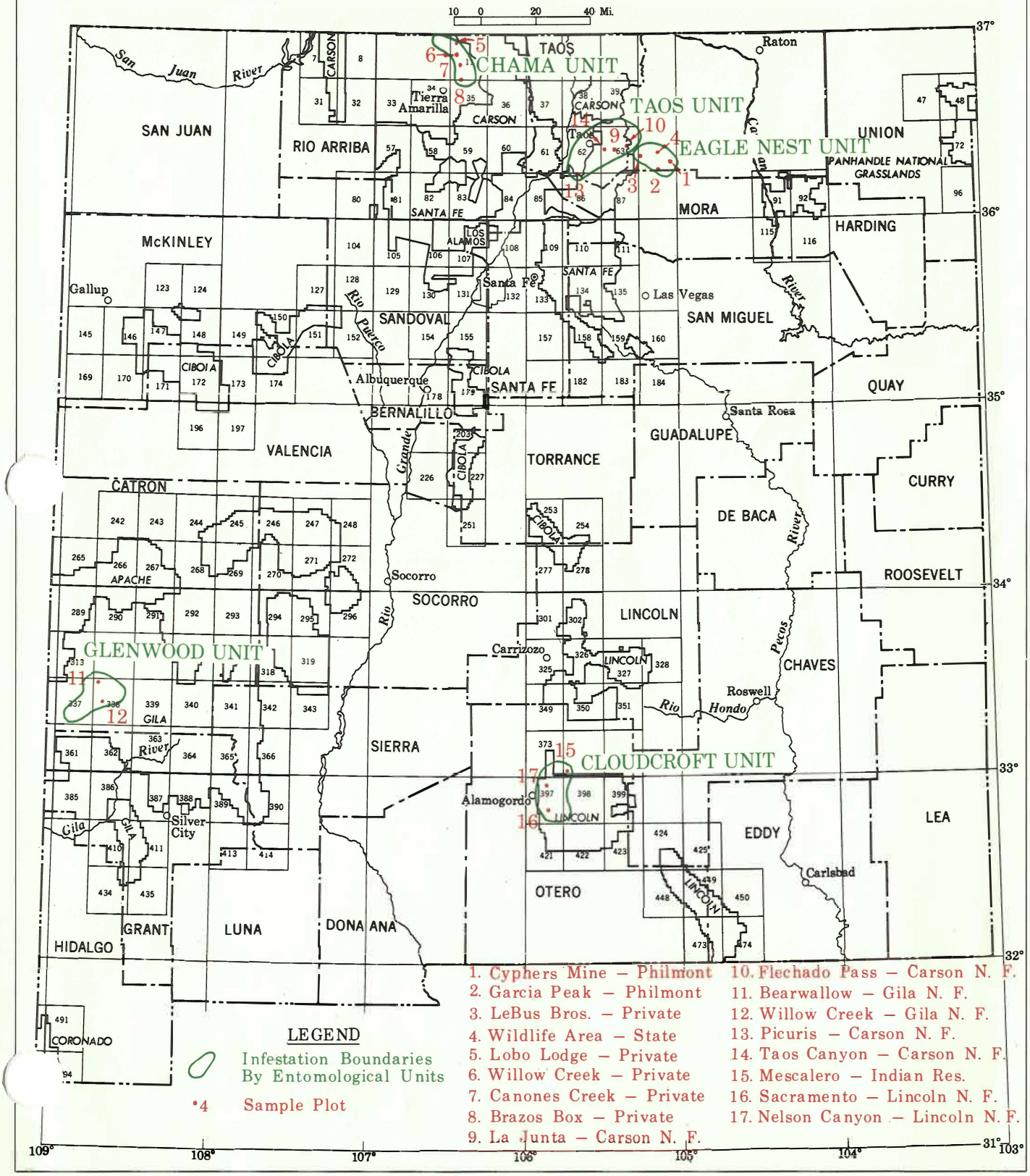
In the two units of Federal ownership (namely, the Glenwood and Cloudcroft units), the situation is strikingly different. In the Glenwood unit the low egg mass count indicates a very light infestation in the sampled area. Therefore, no direct suppression is needed in 1964.

The Cloudcroft unit appears to be a relatively new infestation. There is no evidence to indicate lowering of tree vigor to the point that reproduction and timber values are immediately threatened, although moderate defoliation is expected for this unit. For 1964 direct suppression is not recommended. Direct suppression may be necessary in 1965, especially if the population continues its apparent rapid buildup and defoliation of young reproduction.

BIOLOGICAL EVALUATION
SPRUCE BUDWORM INFESTATION

NATIONAL FOREST AND ADJACENT INDIAN, STATE, AND PRIVATE LANDS

NEW MEXICO
1963



LEGEND

Infestation Boundaries By Entomological Units

•4 Sample Plot

1. Cyphers Mine — Philmont
2. Garcia Peak — Philmont
3. LeBus Bros. — Private
4. Wildlife Area — State
5. Lobo Lodge — Private
6. Willow Creek — Private
7. Canones Creek — Private
8. Brazos Box — Private
9. La Junta — Carson N. F.
10. Flechado Pass — Carson N. F.
11. Bearwallow — Gila N. F.
12. Willow Creek — Gila N. F.
13. Picuris — Carson N. F.
14. Taos Canyon — Carson N. F.
15. Mescalero — Indian Res.
16. Sacramento — Lincoln N. F.
17. Nelson Canyon — Lincoln N. F.